Groundwater Valuation Amidst Litigation in the Brazos Valley Region

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Overview

• Recent Litigation
• Pricing/Valuation
• Possible New Management Concepts and How They Might/Might Not Apply in the BVGCD Area
A Bit of History

• "Landowner 'losers' will be forever prevented from developing or using groundwater beneath their property," he wrote. "The effect of the rule is to discriminate in favor of early applicants and existing in-District users. ... Because these existing users are primarily public entities, the District has, in essence, converted a privately owned resource into a government-controlled public water reserve without compensation to the water's owners."—Russ Johnson, 2005.

• “We’re probably going to get sued from two directions some day. Either we turn someone down for a permit, and they sue us because we’ve been too scrupulous. Or one day when a well goes dry, we get sued by the landowner because we’re too free with water.”--Joe Cooper, General Manager, Lost Pines Groundwater Conservation District, Sep. 2009

Source: The New York Times

Source: The Eagle, The Texas Observer
A Bit More History

- Metropolitan Water Company, L.P.
- 1,312 discrete leases in Vista Ridge wellfield, 50k acres of land, 51k af/yr of water production permitted, 142 mile pipeline to San Antonio
- 1,603 discrete leases in 130 wellfield, 20k acres, 20k af/yr of permitted production, 53 mile pipeline to Manor
- Aggregated over the course of 15 years, now providing the water supplies for the Vista Ridge and 130 pipeline projects
- Also, Brazos River Lower Basin project. More than 2k groundwater leases covering ~32k acres of land.

Source: http://metwater.com/landleases/index.html
Reeves County
Layne Christensen
$1.09/saturated foot (est.)

Ochiltree/Roberts Counties
Mc Cattle/Amarillo
$1.16/saturated foot (per contract)

Burleson County
SAWS Vista Ridge
$460/acre-foot (per contract)

Winkler County
Midland County Fresh Water District #1
$0.83/saturated foot (est.)

Hudspeth County
CL Ranch/El Paso, $1,889/surface acre (~$689/acre for GW estate)

Roberts County, CRMWA/Mesa Water, $488/acre (GW estate)

Gonzales County
GBRA/Texas Water Alliance
~$1,033/acre for GW leases

Martin County
PXD Water Lease
$2,482/AF (potable)/ $1,552/AF (brackish)

Bell County
7KX Investments v. TX DOT
$196,000/surface acre (per settlement)

Medina County
Edwards Aquifer Authority v. Bragg
$25,000/surface acre (jury award)

XTO Water Lease
$3,879/AF

XTO Water Lease
$3,879/AF

XTO Water Lease
$3,879/AF
• Growing corn silage--$105/ac-ft (est.)
  • Using TAMU 2019 irrigated silage District 8 crop budget and assuming a 2,000 acre farm

• For municipal sale—approx. $450/ac-ft (est. based on Vista Ridge pricing)
  • Under Vista Ridge agreement, 10% of that amount actually goes to landowners as a royalty
  • Landowners with larger tracts who directly marketed their water could likely realize a significantly higher price per acre-foot.

• For oilfield sales--$800 or more per ac-ft
  • College Station 2014 effluent sales to Apache Corporation at $2.50/kg or about $815/ac-ft
## What Might Groundwater Be Worth in the Brazos Valley?

### 2019 Estimated Costs and Returns per Acre Herbicide Resistant Corn - Irrigated Central Texas Extension District - 8

<table>
<thead>
<tr>
<th>Crop Acres</th>
<th>Revenue</th>
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<table>
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<tr>
<th>Quantity</th>
<th>Units</th>
<th>Unit Price</th>
<th>Total Per Acre</th>
<th>Enterprise Total</th>
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<td>Corn</td>
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<td>$38.35</td>
<td>$843.70</td>
<td>$1,687,400</td>
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<table>
<thead>
<tr>
<th>Production Costs</th>
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| Herbicide | Post Plant Herbicide | 1 | acre | $15.00 | $15.00 | $30,000 |
| Seed      | HR Corn Silage Seed  | 32 | thousand | $3.50 | $112.00 | $224,000 |
| Fertilizer| 18-46-0              | 150 | pound   | $0.26 | $39.00 | $78,000 |
|          | 0-0-60               | 100 | pound   | $0.20 | $20.00 | $40,000 |
|          | 46-0-0               | 478 | pound   | $0.20 | $95.60 | $191,200 |
| Custom   | Custom Fertilize     | 1 | acre   | $5.00 | $5.00 | $10,000 |
|          | Custom Harvest & Haul Silage | 22 | ton | $8.00 | $176.00 | $352,000 |

| Irrigation | Energy cost | 20 | ac-in | $8.00 | $160.00 | $320,000 |

<table>
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<tr>
<th>Machinery Labor</th>
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</table>

| Tractors/Self-Propelled | 0.25 | hour | $10.00 | $2.50 | $5,000 |
| Diesel Fuel | 1.91 | gallon | $2.40 | $4.58 | $9,168 |
| Repairs & Maintenance | Tractors/Self-Propelled | 1 | acre | $4.36 | $4.36 | $8,720 |
| Implants | 1 | acre | $7.61 | $7.61 | $15,220 |
| Interest on Credit Line | 4.75% | $7.58 | $15,160 |

| Total Variable Costs | $649.23 | $1,298,468 |

| Planned Returns Above Variable Costs | $200.00 | $400,000 |

| Breakeven Price to Cover Variable Costs | $29.51 |

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<tr>
<th>Fixed Costs</th>
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</table>

| Tractors/Self-Propelled | 2 | acre | $4.51 | $4.51 | $9,020 |
| Implants | 1 | acre | $9.89 | $9.89 | $19,780 |
| Equipment Investment | Tractors/Self-Propelled | 35.12 | dollars | 6.00% | $2.11 | $4,214 |
| Implants | 42.31 | dollars | 6.00% | $2.54 | $5,077 |
| Irrigated Land Rent | 2 | acre | $50.00 |

| Total Fixed Costs | $19.05 | $38,092 |
| Total Specified Costs | $668.28 | $1,336,560 |
| Returns Above Specified Costs | $175.42 | $350,840 |
| Breakeven Price to Cover Total Costs | $30.38 |

Total water use per crop: 3,333 ac-ft

Implied net water value per acre-foot: $105
What Might Groundwater Be Worth in the Brazos Valley?

Estimated Value in Place, $ per Acre-Foot

- SAWS Payment to Bluewater Systems for Vista Ridge Water: $460
- Avoided Cost of Self-Supplied Groundwater vs. SJRA Surface Water (400 ft pump depth): $268
- Avoided Cost of Self-Supplied Groundwater vs. SJRA Surface Water (700 ft pump depth): $244
- Vista Ridge Implied Value to Landowners Under BVWA Contract Terms: $227
- Avoided Cost of Self-Supplied Groundwater vs. SJRA Surface Water (1400 ft pump depth): $188
- Foresta Liberty County Project (water value after debt paid off): $183
- Avoided Cost of Self-Supplied Groundwater vs. SJRA Pumage Fee (700 ft pump depth): $182
- Residual Value of Water Used to Grow Hay (Base Case): $132
- Marginal Value of Water Used to Grow Hay During Drought: $108
- HCPUA Royalty To Landowners (Under Full Production): $100
- CRWA Royalty to Carrizo-Wilcox Landowners (Wells Ranch-II Project): $63
- Vista Ridge Royalty to Landowners: $46

Source: Pre-Filed Testimony of Gabriel Collins in “Petitions of the Cities of Conroe and Magnolia, Texas and Quadvest, LP Appealing Desired Future Conditions of GMA 14 Adopted by Lone Star Groundwater Conservation District,” SOAH DOCKET NO. 958-17-3121, September 2017

Most likely value range for groundwater in place in Montgomery County.
What Might Groundwater Be Worth in the Brazos Valley?

Proximity Dramatically Affects Water Supply Economics

**FIGURE 1 — VISTA RIDGE DELIVERED WATER COST**

- If a city is trying to avoid importing distant water, there is a potentially significant valuation uplift that nearby water suppliers can realize.

- Medium-sized cities such as Bryan and College Station likely cannot take on the financial risk of multibillion dollar supply projects on the scale of the Vista Ridge pipeline.

- Accordingly, they will likely seek to augment their water resources by acquiring groundwater bearing tracts near their existing wellfields and pipelines, using a more financially-viable strategy of incremental expansion. This in turn is likely to drive ongoing market activity in the form of such cities leasing or purchasing entire land tracts, or at the very least, the groundwater estate beneath them.
Water’s Logistics Cost/Underlying Value Ratio Poses Economic Challenges

- Water moving 142 miles
- Soybeans moving nearly 1,400 miles
- Crude oil moving about 500 miles

Source: Bloomberg, SAWS, Texas RRC
Adverse Consequences of Political Restrictions on Water Production and Exports

• Economic inefficiencies (effective transfer of privately-owned water to historical users and cities with no compensation, or at rates that are lower than what could be fetched in a freer marketplace)

• Environmental inefficiencies (is it better to have a farm using for instance 2000 acre feet per year to grow a water-intensive crop, or would it be better for them to make the same amount of profit selling 500 AF/year into a pipeline to Austin, Bryan-College Station, Temple, etc.?)
What If Harris County Forbade or Restricted Gasoline Exports?

What is the logical difference if a GCD stifles groundwater exports?

And what are the practical implications of such GCD actions?

Source: Bloomberg
“I thought it would be interesting to show I could grow rice in the Chihuahuan Desert, but I can’t sell water to people who really need it.” —Jeff Williams, Clayton Williams Farms & Ranches
## GCD Restrictions: Practical Implications

<table>
<thead>
<tr>
<th>Industry</th>
<th>Direct economic value generated per gallon of water used</th>
<th>Gallons of water needed to create $1 in direct economic value</th>
<th>Value Created Per AF of Water Used</th>
<th>AF of Water Consumed Per Billion USD in Economic Value Created</th>
<th>Depth of Coverage Over City of Houston's Physical Area, Inches</th>
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<tr>
<td>Natural Gas, Marcellus Shale</td>
<td>$3.804</td>
<td>0.3</td>
<td>$1,239,417</td>
<td>807</td>
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<td>Morphine</td>
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<td>0.4</td>
<td>$927,745</td>
<td>1,078</td>
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<td>Pickup Truck Tire, High</td>
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<td>$601,255</td>
<td>1,663</td>
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<td>Crude Oil, Delaware Basin</td>
<td>$1.692</td>
<td>0.6</td>
<td>$551,187</td>
<td>1,814</td>
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<td>Semiconductors</td>
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<td>0.9</td>
<td>$381,226</td>
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<td>Houston, Texas MSA</td>
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<td>1.0</td>
<td>$328,401</td>
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<td>Pickup Truck Tire, Low</td>
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<td>Ford Focus</td>
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<td>$101,953</td>
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<td>Pork</td>
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<td>9.0</td>
<td>$36,261</td>
<td>27,578</td>
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<tr>
<td>Steel (ArcelorMittal)</td>
<td>$0.098</td>
<td>10.2</td>
<td>$31,889</td>
<td>31,359</td>
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<td>Beer</td>
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<td>$31,669</td>
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<td>Levi’s 501 Jeans</td>
<td>$0.046</td>
<td>22.0</td>
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<td>Chicken Meat</td>
<td>$0.017</td>
<td>58.5</td>
<td>$5,573</td>
<td>179,422</td>
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<td>Drip-Irrigated Pecans, Pecos Valley</td>
<td>$0.008</td>
<td>123.9</td>
<td>$2,630</td>
<td>380,275</td>
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<td>Flood-Irrigated Pecans, Pecos Valley</td>
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<td>Alfalfa, Pecos Valley</td>
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<td>348.5</td>
<td>$935</td>
<td>1,069,458</td>
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<td>Cotton (West Texas)</td>
<td>$0.001</td>
<td>678.8</td>
<td>$480</td>
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<td>Refined Sugar</td>
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<td>293</td>
<td>$293</td>
<td>3,409,875</td>
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<td>Eggs</td>
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<td>270</td>
<td>$270</td>
<td>3,706,080</td>
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<td>Coffee (green)</td>
<td>$0.001</td>
<td>4,384,125</td>
<td>125.50</td>
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<td>Rice</td>
<td>$0.001</td>
<td>4,401,954</td>
<td>126.01</td>
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<tr>
<td>Peanuts (in shell)</td>
<td>$0.001</td>
<td>5,114,812</td>
<td>146.42</td>
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The Litigation

- Stratta et al v. Roe et al, 6:18-cv-00114-ADA-JCM, W.D. TX, Waco

Filed Apr. 2018

Claim dismissals Nov./Dec. 2018

Plaintiff’s Claims:

- Dismissed w/o prejudice on account of “ripeness”
  - First Amendment violation
  - Equal Protection violation
  - Taking of groundwater

- Dismissed w prejudice for failure to state a claim
The Federal Court’s Reasoning Illustrates Potential Future Litigation and Legislative Action Pathways

Some Key Ideas

• The district judge clearly loathed the prospect of rendering a federal decision that would likely have a multi-billion dollar, long-term impact across Texas.

• There are real, highly complex public policy issues here concerning how the Texas body politic will balance the rights of predominantly rural groundwater property owners with the legitimate water needs of growing cities.

• Markets offer possible solutions and we’ll need to contemplate the costs of more market-based groundwater sourcing versus the “municipal carveout” approach that dominates today.

• One thing to consider is that West Texas cities like Amarillo, Lubbock, and Midland have been able to function well and grow economically despite having to buy large tracts of groundwater rights at prevailing market prices to sustain themselves.

How This Case May Shape Legal Strategies

• Various plaintiffs will likely bring additional groundwater takings claims in state court
  • “The Texas Legislature, by providing for groundwater conservation districts, has set the stage for a court case to decide the permissibility of pumping limits”—12(b)(1) Order, P.19

• Expect state court cases specifically aimed at invoking the Marrs fact pattern
  • “Moreover, Texas courts have not clarified to what extent oil and gas law applies to groundwater disputes.”—12(b)(6) Order, P.9

• At least some of this will likely commence within the next 12 months.
• Also expect the Legislature to take up some of these issues in 2021.
Judicial and Political Risk Assessment: How Might Future Groundwater Cases Be Decided?

- Water cases often take a long time to reach final Supreme Court ruling.
- How does this factor into risk calculation based on composition of the Court?
- How much longer will the CLR court be in place? How does the bench potentially evolve? Do we get a Democratic governor in 2022? Will there emerge a Beto-type candidate with a credible shot at becoming governor and appointing new Supreme Court justices?
What If A Mid-Sized City Had To Buy 650 Acres For Each of Its 10 Municipal Water Wells?

Caveats & Assumptions

• Many municipal wells are grandfathered under historical use permits
• Assume debt financing, 20 year term, 5% interest rate

Source: Bryan CAFR 2017, Netflix, Author’s Analysis
What If Bryan Had To Compensate Fazzino For The Water It Has Pumped From Well #18?

27 thousand acre-feet is a lot of water. Assuming a value of $100 per AF, the value at stake would be about $2.7 million. But there are complicated allocation factors.

- Consider, for instance the question of how much of this water originated from under the Plaintiff’s land? How much could plausibly qualify as property of the other neighbors?

20 thousand acre-feet is about 8.8 billion gallons or about 27 thousand acre-feet.
Implementing three-dimensional groundwater management in a Texas groundwater conservation district

Hilmar Blumberg and Gabriel Collins

Abstract: The Guadalupe County Groundwater Conservation District has implemented a 3-dimensional water management solution that allocates pumping rights based on actual volumes in place under a tract. This new regime treats the aquifer as a "constant level lake" where rights holders are awarded the right to a percentage of the inflow (recharge) based on the volume of saturated sand underneath their property.

Three-dimensional management can improve Texas groundwater governance by strengthening property rights, promoting conservation, and unlocking economic value by promoting water trading and collateralization. It is also cost-effective and can be rapidly implemented: the Guadalupe County Groundwater Conservation District created its initial 3-dimensional dataset in approximately 4 months at a cost of roughly $15,000. Larger districts or districts that could not benefit from an existing property parcel map created by an appraisal district would face higher costs. Creating the type of property ownership maps used by local tax appraisal districts can cost as much as $100,000. Yet the intensive property tax regime in Texas means that even the least-populous counties typically already have such information available in digital form.
Alternative Aquifer Management Concept: The Financial and Legal Rationale

- Unitization/Three-Dimensional Aquifer Management
Discussion Questions

• What happens if a groundwater conservation district applies its regulations inconsistently? What are the appropriate responses?
  • HoA analogy
  • Does pooling better protect groundwater owner rights?
  • What about voluntary pooling for a specific purpose, for instance, commercial water sales?

• Is there a better way to allocate water than the current production/spacing/acreage formula?
  • Three-Dimensional management
  • Fair Chance/correlative rights
  • Something else altogether?

• Do any of you sell water or have you sold all or part of your GW estate?
• Are the water brokers active yet in this area?
• Would you be willing to participate in periodic valuation surveys?
Thank you!

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